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# CURRICULUM VITAE

DECEMBER 2009

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## Education

- 1998 - 2006 Charles University in Prague, Czech Republic
  - 2003 Master's degree in Mathematics (supervisor Prof. Věra Trnková)
  - 2006 Ph.D. in Mathematics (supervisor Prof. Věra Trnková)

## Jobs

- 2007-present Assistant professor, Department of Algebra, Charles University in Prague, Czech Republic
- part of 2007 and 2008 Research position, Academy of Sciences of the Czech Republic

## Research interests

universal algebra, computational complexity, combinatorics and category theory

## Publications

### Published and accepted papers:

1. L. Barto, M. Kozik, *Congruence distributivity implies bounded width*, to appear in SIAM Journal on Computing
2. L. Barto, M. Kozik, *Cyclic terms for  $SD(v)$  varieties revisited*, to appear in Algebra Universalis
3. L. Barto, M. Kozik, M. Maroti, R. McKenzie, T. Niven, *Congruence modularity implies cyclic terms for finite algebras*, Algebra Universalis 61/3 (2009), 365-380
4. L. Barto, M. Kozik, *Constraint Satisfaction Problems of Bounded Width*, Proceedings of the 50th Annual IEEE Symposium on Foundations of Computer Science, FOCS'09 (2009), 595-603
5. L. Barto, M. Kozik, M. Maroti, T. Niven, *CSP dichotomy for special triads*, Proc. Amer. Math. Soc. 137 (2009), 2921-2934
6. L. Barto, *Slices of essentially algebraic categories*, Applied Categorical Structures 17/2 (2009), 119-152
7. L. Barto, M. Kozik, T. Niven, *The CSP dichotomy holds for digraphs with no sources and no sinks (a positive answer to a conjecture of Bang-Jensen and Hell)*, SIAM Journal on Computing 38/5 (2009), 1782-1802
8. L. Barto, M. Kozik, T. Niven, *Graphs, Polymorphisms and the Complexity of Homomorphism Problems*, Proceedings of the 40th ACM Symposium on Theory of Computing, STOC'08 (2008), 789-796
9. L. Barto, *The category of varieties and interpretations is alg-universal*, Journal of Pure and Applied Algebra 211/3 (2007), 721-731
10. L. Barto, *Finitary set endofunctors are alg-universal*, Algebra Universalis 57/1 (2007), 15-26
11. L. Barto, P. Zima, *Every group is representable by all natural transformations of some set-functor*, Theory and Applications of Categories 14/13 (2005), 294-308
12. L. Barto, *Weakly terminal objects in quasicategories of set endofunctors*, Applied Categorical Structures 13 (2005), 257-264

### Papers in preparation (titles not final):

1. L. Barto, M. Kozik, *Smooth theorem revisited*
2. L. Barto, J. Bulín, *CSP dichotomy for special polyads*
3. L. Barto, *CD implies NU*
4. L. Barto, M. Kozik, *Cyclic operations in finite algebras*
5. L. Barto, *Accessible set endofunctors are universal*

## Theses:

1. L. Barto, *Full embeddings and their modifications*, Ph.D. thesis, Charles University in Prague, 2006
2. L. Barto, *Functors close to full embeddings*, in Czech (Funktory blízké úplným vnořením), Master's thesis, Charles University in Prague, 2003

## Talks

### Conference talks:

- October 2009: *Constraint satisfaction problems of bounded width* at FOCS 2009, Atlanta, USA
- September 2009: *Congruence distributivity and near unanimity* at Summer School on Algebra and Ordered Sets 2009, Stará Lesná, Slovakia
- August 2009: *Prague strategies*, **plenary invited talk** at Novi Sad Algebraic Conference, Novi Sad, Serbia
- June 2009: *Cyclic terms for join semi-distributive varieties I* at 78. Arbeitstagung Allgemeine Algebra, Bern, Switzerland
- June 2009: *On the complexity of H-coloring*, In Czech (O složitosti H-barvení digrafu) at STTI 2009, Prague, Czech Republic
- May 2009: *CSPs of bounded width II* at CanaDAM 2009, Montreal, Canada
- November 2008: *Constraint satisfaction problems of bounded width*, **plenary invited talk** at Annual Meeting of the Eduard Čech Center, Třešť, Czech Republic
- September 2008: *The algebraic approach to CSP* at Fall School of Logic & Complexity, Prague, Czech Republic
- May 2008: *CSP and  $NU(4)$*  at 76th Workshop on General Algebra, Linz, Austria
- September 2007: *Modularity and coloring of terms by variables* at 45th Summer School on General Algebra and Ordered Sets, Tale, Slovakia
- July 2007: *Jónsson terms imply cyclic terms for finite algebras* at Algorithmic Complexity and Universal Algebra, Szeged, Hungary
- June 2007: *Set functors determined by values on objects* at International Conference on Order, Algebra, and Logics, Nashville, USA
- February 2007: *Baskets of essentially algebraic categories* at 73rd Arbeitstagung Allgemeine Algebra, Klagenfurt, Austria
- November 2006: *Clones are comprehensive* at ECC meeting, Telč, Czech Republic
- September 2006: *The category of varieties is alg-universal* at Summer School on General Algebra and Ordered Sets, Radějov, Czech Republic

- February 2006: *Algebraic universality of set endofunctors* at 71. Arbeitstagung Allgemeine Algebra, Bedlewo, Poland
- June 2004: *Axioms for Concrete Categories* at Week of Doctoral students, Prague

### Seminar talks:

- November 2007: *The algebraic approach to the constraint satisfaction problem, recent progress* at University of Linz, Austria
- December 2007: *The algebraic approach to CSP, recent progress* at Jagiellonian University in Krakow, Poland
- November 2008: *Meet semidistributivity has bounded width* at University of Szeged, Hungary
- December 2008: *Constraint satisfaction problems of bounded width* at Jagiellonian University in Krakow, Poland
- September 2009: *Finitely related algebras generating a congruence distributive variety* at University of Szeged, Hungary
- 2003 - present: Many talks on the following seminars at Charles University: Seminar on general mathematical structures, Algebra seminar, Seminar on combinatorial, algorithmic and finite algebra, Topological seminar

### Grant participation

All grants listed are funded by the Czech government.

- 2002 - 2004: GAČR 201/02/0148 *Categorical methods in informatics and structural mathematics*
- 2006 - 2008: GAČR 201/06/0664 *Categorical methods in structural mathematics*
- 2007: LC 505 Eduard Čech Center (a project within the scheme "Centers of Excellence in Basic Research")
- 2008 - 2009: MEB 050817 *An Algebraic Approach to the Constraint Satisfaction Problem*, Czech-Polish cooperation project
- 2009 - 2010: MEB 040915 *Graph, Grupoids and Algorithms*, Czech-Hungarian cooperation project
- 2009 - 2011: GAČR 201/09/P223 *Constraint Satisfaction Problem and Universal Algebra*, postdoctoral project

### Teaching Experience

Courses at our university are split into lectures and seminars (exercise sessions).

### Exercise sessions:

- 2003/04 fall Linear Algebra and Geometry
- 2003/04 spring Linear Algebra and Geometry
- 2004/05 fall Linear Algebra and Geometry
- 2004/05 spring Linear Algebra and Geometry
- 2005/06 fall Linear Algebra and Geometry
- 2005/06 spring Linear Algebra and Geometry
- 2006/07 fall Linear Algebra and Geometry
- 2006/07 spring Computer Algebra, Linear Algebra and Optimization
- 2007/08 fall Algebra
- 2008/09 fall Linear Algebra and Geometry, Algebra
- 2008/09 spring Linear Algebra and Geometry
- 2009/10 fall Tame Congruence Theory Seminar, Linear Algebra and Geometry

### Lectures:

- 2006/07 spring Computer Algebra
- 2007/08 spring Finite Fields
- 2008/09 spring Finite Fields
- 2009/10 fall Introduction to the Complexity of the CSP

### Other

- Awards
  - successful participation in many mathematical competitions for high school students and university students, best results:
    - \* 1997: Silver medal at International Mathematical Olympiad, Argentine
    - \* 1998: Silver medal at International Mathematical Olympiad, Taiwan
    - \* 2000: First prize at International Mathematical Competition for University Students, United Kingdom
  - 1998: Grammar School Student Award of the Learned Society of the Czech Republic
- Organization of conferences, workshops, etc.
  - June 2010: International Conference on Algebras and Lattices, Prague, Czech Republic (a member of the organizing triumvirate)

- August 2009: CSP workshop, Prague, Czech Republic (informal workshop for 20 participants)
- September 2008: 46th Summer School on Algebra and Ordered Sets, Třešť, Czech Republic (a member of the organizing quadrumvirate)
- 1998-2006: Correspondence Seminar for high school students, mathematical camps
  
- Refereeing and reviewing
  - Contributions to General Algebra, Czech. Math. Journal, EMS newsletter, Journal of the ACM, SIAM Journal on Discrete Mathematics, SODA 2010
  
- Languages
  - active knowledge of English
  - passive knowledge of German
  
- Computer skills
  - programming languages (Pascal, BASIC, Assembler)
  - standard office and typesetting software ( $\text{\LaTeX}$ )
  
- Extracurricular activities
  - flute, piano
  - hiking, floorball, downhill skiing, ...